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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/806,274
Filing Date: March 27, 2001
Appellant(s): BEIMESCH, WAYNE EDWARD

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Xiaoyue Chen
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 23 July 2007 appealing from the Office action mailed 16 November 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

This application is before to the Board of Patent Appeals and Interferences for the second time. A copy of the decision rendered 19 March 2004 is attached to the appellant's brief.

The examiner is not aware of any other related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

U.S. Patent 5,140,845	Robbins	08-1992
U.S. Patent 5,809,664	Legros *et al.*	09-1998

"*Chemical Principles*" to Masterton *et al.*, 1985, pages 322-328.

"*Compilation of Air Pollutant Emission Factors, Method AP-42*" to the Environmental Protection Agency (EPA), July 1993, pages 6.8-1 to 6.8-7 and pages 7.1-1 to 7.1-102.

(9) Grounds of Rejection

As an initial matter the double patenting rejection of claims 1-3 and 6 is hereby withdrawn from this appeal. The appellant has canceled the conflicting claims in the continuation application 10/724,564.

The following ground(s) of rejection are applicable to the appealed claims.

(A) Claims 1-7 stand as rejected under 35 U.S.C. 103(a) as being unpatentable over the appellant's admitted prior art in view of United States Patent 5,140,845 to Robbins, United States Patent 5,809,664 to Legros *et al.*, Chemical Principles" to Masterton *et al.*, and "Compilation of Air Pollutant Emission Factors, AP-42" to the Environmental Protection Agency (EPA), hereinafter referred to as EPA Method AP-42.

The appellant admits that monitoring and controlling volatile organic compound (VOC) emissions is known. More specifically, the appellant states in the written description on page 1 (emphasis added):

> A long-standing problem in the chemically-related manufacturing industry has been the way in which the rate of VOC emissions is controlled and monitored. The concerns associated with _VOC control and monitoring are well rooted in governmental policies throughout the world, all of which are aimed at reducing the emission of such VOCs into the atmosphere. Additionally, the manufacturing industries themselves have been notably concerned with safety and environmental concerns associated with VOC emissions_. As a result, since the onset of the industrial revolution, the chemically-related manufacturing industry has striven for zero to minimal VOC emissions. To that end, relatively expensive and time-consuming _VOC measurement techniques have been developed and have been constantly employed to monitor VOC emissions of virtually every unit operation in every manufacturing facility throughout the world_. In fact, numerous companies have sprouted into existence which specialize in testing techniques for VOCs and aid in ensuring compliance with specific strict company as well as governmental regulations. Such specialization and expertise render these services extremely expensive, and therefore, significantly add to the overall expense of whatever product is being manufactured. Accordingly, there remains a need in the art for an inexpensive, less time-consuming, method by which VOCs can be conveniently measured for a given material being produced in a process system.

The admitted prior art teaches that virtually every unit operation in every manufacturing facility throughout the world monitors for VOC emissions. There is no express mention in the admission for monitoring and/or sampling from a fluid bed dryer, a spray bed dryer, or a storage tank. The admitted prior art also does not teach holding the sampled material at a mean exit temperature of the emissions of a process system.

With regard to the first issue it is noted that Legros *et al.* teaches that known that fluid bed dryers can operate up to 400 °C and are a known source of VOCs.

With regard to the second issue Robbins teaches a simple, low cost process for sampling and detecting VOCs. In particular Robbins teaches a process of sampling material from a system, storing the sample in an enclosed bag, sealing the bag, storing the bag until equilibrium is reached in the headspace, and then sampling the headspace in order to determine if VOCs are present. This detection is accomplished using a flame ionization detector (FID). It is known that gas chromatographs and FIDs are used to determine analyte quantities in the sample based on the peak value; i.e., the measured response of the GC/FID. Robbins does not expressly teach a method wherein the sampled material is stored at the mean exit temperature of said emissions of said system.

Masterton *et al.* is cited herein to provide support of the commonly known scientific principles of liquid-vapor headspace equilibrium in a closed system. In Masterton *et al.* a sealed flask is used, however the scientific principles apply equally to a sealed bag. Masterton *et al.* teaches that a liquid placed in the closed system will, over time, reach a state of equilibrium with regard to the headspace. Equilibrium is the state wherein, at any given temperature, the number of molecules from the liquid entering into the vapor state (into the headspace) equals the number of molecules reentering the liquid

state. At higher temperatures a larger fraction of molecules will acquire enough energy to escape from the liquid to the vapor. This means that at higher temperatures more vapor molecules will be present in the headspace than at lower temperatures. Over time a state of headspace equilibrium will be reached. It is just that more molecules will be present in the vapor when equilibrium is reached using higher temperatures.

Furthermore, EPA Method AP-42, §6.8.3.1, states (emphasis added):

> The main atmospheric pollution problem in soap manufacturing is odor[1]. The storage and handling of liquid ingredients (including sulfonic acids and salts) and sulfates are some of the sources of this odor. *Vent lines, vacuum exhausts, raw material and product storage, and waste streams are all potential odor sources*. Control of these odors may be achieved by scrubbing exhaust fumes and, if necessary, incinerating the remaining volatile organic compounds (VOC).

In §6.8.3.2 it is also stated (emphasis added):

> In addition to particulate emissions, volatile organics may be emitted when the slurry contains organic materials with low vapor pressures. The VOCs originate primarily from the surfactants included in the slurry. *The amount vaporized depends on many variables such as tower temperature and the volatility of organics used in the slurry*. These vaporized organic materials condense in the tower exhaust airstream into droplets or particles. Paraffin alcohols and amides in the exhaust stream can result in a highly visible plume that persists after the condensed water vapor plume has dissipated.
>
> *Opacity and the organic emissions are influenced by granule temperature and moisture at the end of drying, temperature profiles in the dryer, and formulation of the slurry*. A method for controlling visible emissions would be to remove offending organic compounds (i.e., by substitution) from the slurry. Otherwise, tower production rate may be reduced thereby reducing air inlet temperatures and exhaust temperatures. Lowering production rate will also reduce organic emissions.

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[1] EPA Method AP-42 refers to odors as VOCs.

It is quite clear from the teachings of EPA Method AP-42 that process system temperatures are a major causal factor in the amount of VOCs released into the atmosphere. Furthermore, fluid bed dryers (from Legros *et al.*), drying towers, vent lines, vacuum exhausts, and waste streams are all regions within a process system whose temperature; e.g., the mean exit temperature, can be measured.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of the admitted prior art with the teachings of Robbins, Legros *et al.*, Masterton *et al.*, and EPA Method AP-42 in order to provide a sample of material produced in a process system such as a fluid bed dryer, seal the material in an enclosed bag in order to have a headspace, holding the material at the mean exit temperature of the emissions of the fluid bed dryer in order to allow the headspace to come to equilibrium, and then testing for the presence of VOCs using techniques such as an FID.

First, sampling from a fluid bed dryer would have been obvious since the appellant admits that virtually every manufacturing facility worldwide must monitor for VOCs, and Legros *et al.* teaches that fluid bed dryers are a known source of VOCs. Furthermore, replicating the conditions of the process that creates VOC-containing products; i.e., replicating the exit temperatures at which VOC-containing products are manufactured or processed would allow one to determine if the process was indeed causing excessive VOCs to be released into the atmosphere. Finally, Robbins teaches a low-cost, simple

method and apparatus for detecting VOCs in relatively small samples. One would certainly look to the teachings of Robbins in order to implement an ongoing sampling process that reduces expenses and is also relatively simple to perform. Finally, Robbins clearly addresses this shortcoming noted in the appellant's admitted prior art; i.e., Robbins clearly shows an inexpensive, less time-consuming process for conveniently measuring VOCs.

With regard to claim 3 the only difference between this claim and claim 2 is the replacement of the term "fluid bed dryer" with "spray bed dryer" as the source of the sampled material. Again, the admitted prior art teaches that virtually every unit operation in every manufacturing facility throughout the world monitors for VOC emissions. Furthermore, EPA Method AP-42 states in §6.8.3.1 that spray bed dryers are a known source of VOCs. One of ordinary skill would be motivated and, more than likely, legally required obtain samples from the spray bed drying process in order to determine the amount of VOCs being released.

With regard to claim 6 the only difference between this claim and claim 2 or 3 is the replacement of the term "fluid bed dryer" or "spray bed dryer" with "storage tank" as the source of the sampled material. Again, the admitted prior art teaches that virtually every unit operation in every manufacturing facility throughout the world monitors for VOC emissions. Furthermore, EPA Method AP-42 states in §6.8.3.1 that product storage areas; e.g., storage tanks, are a known source of VOCs. One of ordinary skill would be motivated and, more

than likely, legally required obtain samples from the storage tank process in order to determine the amount of VOCs being released.

With regard to claim 4 Robbins teaches that time is a relevant factor to reach the desired equilibrium in the headspace (column 4, lines 57-58). One of ordinary skill would know to store the material in the enclosed bag for a time sufficient to reach equilibrium as this would produce a VOC concentration in the headspace that is representative of actual process system operation. The appellant has not providing any evidence, either in the specification or in any response to any office action, that their claimed storage time produces an unexpected or unobvious result over the teachings of the prior art. See *In re Woodruff*, 919 F.2d 1575, 1578 [16 USPQ2d 1934] (Fed. Cir. 1990) ((where "the difference between the claimed invention and the prior art is some range or other variable within the claims..., the [patentee] must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results) and (Courts have long held ... that even though [a] modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art, unless the claimed ranges "produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art." (quoting *In re Aller*, 220 F.2d 454, 456 [105 USPQ 233] (C.C.P.A. 1955)))).

With regard to claim 5 Robbins teaches that the initial mass of the sample is directly related to the measured equilibrium headspace concentration (equation 5, equation 7). One of ordinary skill would know to provide a representative sample size from the process system necessary for reaching equilibrium in the headspace so that the VOC concentration is representative of actual process system operation. See again *In re Woodruff*.

With regard to claim 7 one of ordinary skill would choose a temperature that is representative of the specific operating conditions of the process system; e.g., spray bed dryer, fluid bed dryer, storage tank, etc., that is producing VOCs so that the headspace VOC concentration is representative of actual process system operation. See again *In re Woodruff*.

(10) Response to Arguments

(A) The appellant argues that Robbins requires agitation of the sample in the bag, but that the instant invention does not require agitation.

In response it is noted that the written description, as originally filed, does not expressly state that agitation is not to be used or is somehow not possible in the presently-claimed method. It is also noted that the steps cited in claim 1 use the open-ended term "comprising." Therefore, the appellant's claimed method could encompass any additional steps including agitating the bag.

(B) The appellant argues that Robbins does not teach or suggest a method for measuring volatile organic compounds in a process system having emissions.

In response it is noted that a "process system", as interpreted by the Board in their previous decision, can be an open or closed system. See pages 3 and 4 of the prior decision refuting the appellant's position that process systems are closed systems (emphasis in original):

> We cannot subscribe to appellant's position. We determine that the broadest reasonable interpretation of the plain language of the claim phrase taken in light of the claim language as a whole and the written description in the specification, requires that the claimed method measures the VOCs of *any* "material," and thus can include liquid, paste or solid "material," as set forth in the specification (page 3, lines 3-4), which is "produced in" *any* "process system," open or closed, "having emissions," that can be VOC emissions, wherein the "material" produced in the process system can contain VOCs. Thus, "a material" can include any intermediate or final "product" that is produced by "a process system having emissions," including materials that are VOCs *per se*. However, while the "process system" can be open or closed, it must be one in which "the mean exit temperature of said emissions of said system" can be determined in order to establish the temperature at which the "enclosed bag containing said material" is stored so that "equilibrium between said material and said headspace is reached" as specified in appealed claim 1.

The appellant never challenged this interpretation by the Board. Under this interpretation a storage tank, especially a leaky tank as discussed in Robbins, would be a "process system" having emissions. Furthermore, the admitted prior art and Legros *et al.* were cited to further show the express teachings that "process systems" are known to be sources of VOCs. Irrespective of this it is also noted that Robbins was not expressly relied upon for a teaching of a "process system". Rather, Robbins was principally relied upon for the teaching

that it is known to sample materials in order to determine if VOCs are being released.

(C) The appellant argues that Legros *et al.* teaches a drying system, but does not teach a method for measuring VOCs in a process system having emissions.

In response it is Robbins that was cited to show a method for measuring VOCs in a process system having emissions. Furthermore, the appellant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Legros *et al.* was cited to show that specific process systems; e.g., fluid bed dryers, are known sources of VOCs.

(D) The appellant argues that Masterton *et al.* is a general chemistry text, but does not teach a method for measuring VOCs in a process system having emissions.

In response it is Robbins that was cited to show a method for measuring VOCs in a process system having emissions. Furthermore, the appellant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Masterton *et al.* was cited to show general knowledge in headspace analysis; i.e., to show that a) headspace equilibrium

will always be reached, in time, irrespective of the temperature and b) that at a higher temperature the headspace will have a higher concentration of molecules when equilibrium is reached than if a lower temperature was used.

(D) The appellant argues that EPA Method AP-42 is a general fact sheet compiled by the EPA on techniques for studying air pollution, but does not teach a method for measuring VOCs in a process system having emissions.

In response it is noted that the EPA Method AP-42 was not cited to show a method for sampling and analyzing. That teaching is found in Robbins. Rather, the EPA Method AP-42 was cited to show that <u>process system temperatures are a major causal factor in the amount of VOCs released into the atmosphere</u>. Furthermore, the appellant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

(E) The appellant argues that there is no scientific argument or objective evidence of-record to show why one would have adapted the headspace method of Robbins to use and analyze a material produced by a process system having emissions using the mean exit temperature.

In response it is noted that objective and/or scientific evidence was made of-record in the form of the above references to Robbins, Legros *et al.*, Masterton *et al.*, and the EPA Method AP-42. The EPA Method AP-42 teaches

that increased temperatures can increase the amount of VOCs released into the atmosphere. The EPA Method AP-42 also shows that process systems are known to be sources of VOCs. Legros *et al.* teaches that high-temperature process systems such as a fluid bed dryer can be a source of VOCs. Masterton *et al.* teaches that, at higher temperatures one will obtain a higher concentration of molecules in the headspace. Finally, Robbins teaches placing a sample of material in a closed space, waiting for equilibrium, and then sampling the headspace to determine if VOCs are present.

Adapting the method of Robbins to store the bag at the mean exit temperature would allow for an increase in the concentration of VOC molecules in the headspace and would replicate the exiting conditions of process system. This would allow one to determine the quantity of VOCs being released into the atmosphere.

(F) The appellant argues that the teachings from Legros *et al.*, Masterton *et al.*, and EPA Method AP-42 do not teach that the mean exit temperature is more desirable than the ambient temperature used by Robbins.

In response it was noted above the EPA Method AP-42 teaches that increased temperatures can increase the amount of VOCs released into the atmosphere. The EPA Method AP-42 also shows that process systems are known to be sources of VOCs. Legros *et al.* teaches that process systems can operate at increased temperatures and are a known source of VOCs. From Masterton *et al.* it is known that, at higher temperatures, one will obtain a

higher concentration of molecules in the headspace. Clearly the combined teachings of the cited references show that, by holding the bag of Robbins at higher temperatures one would obtain a higher concentration of the VOCs in the headspace thus replicating the exiting conditions of the process system

(G) The appellant argues that impermissible hindsight was used to reconstruct the invention.

In response to appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the appellant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In the present application it was shown that obtaining a sample of a material, maintaining the material in a closed environment at a constant temperature, and sampling and analyzing the headspace for the presence of VOCs is known. It was shown that there is ample knowledge in the prior art that increased temperatures increased the concentration of molecules in the headspace of a closed environment. Finally, it was shown above that there is ample knowledge in the prior art that higher temperatures increase the amount of VOCs that are released into the atmosphere. Clearly one or ordinary skill

would recognize that by holding the bag of Robbins at the mean exit temperature one would be able to replicate the exiting conditions of the process system and also determine the quantity of VOCs being released to the atmosphere.

(11) Related Proceeding(s) Appendix

This application is before to the Board of Patent Appeals and Interferences for the second time. A copy of the decision rendered 19 March 2004 is attached to the appellant's brief.

No other decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

David Rogers
Examiner - Art Unit 2856

Conferees:

Hezron Williams

Darren Schuberg